RBC Global Asset Management

Developing long-term capital market expectations

JUNE 2025

The first step in constructing a well-diversified portfolio is to establish a base Strategic Asset Allocation (SAA). The SAA provides a recommended asset mix that balances an expected return at an expected level of risk. The SAA provides the "bogey" portfolio that can then be tactically shifted based on shorter-term trends and the market outlook. Building a range of SAA portfolios necessitates formulating long-term assumptions about asset class returns, risk, and correlation characteristics as well as key economic and capital market variables. RBC Global Asset Management's (RBC GAM) process for handling this complex task is described here.

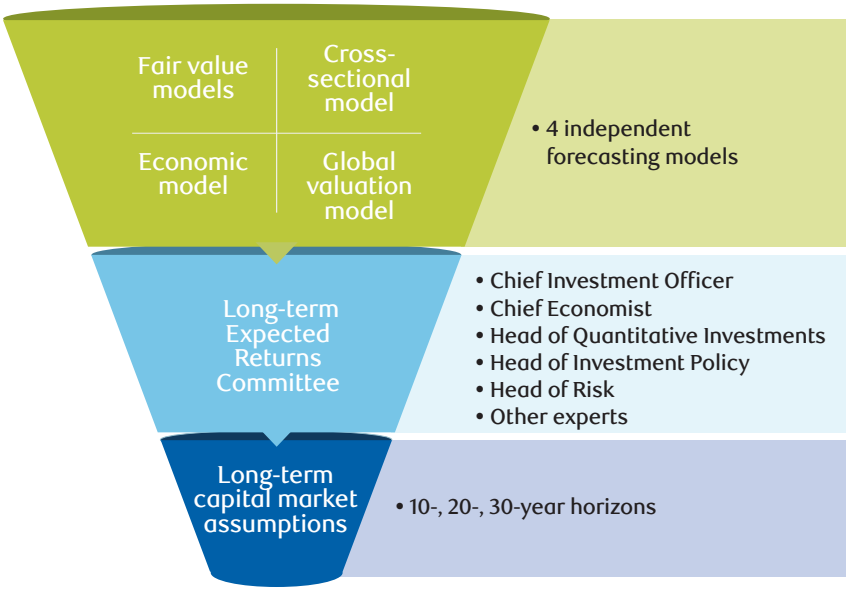
Multi-model comprehensive approach

RBC GAM employs multiple independent forecasting models from different investment teams within RBC GAM. This approach allows for coverage of more asset classes and helps mitigate some of the risk of bias inherent in a single forecasting model. This provides a multi-faceted view across a wide range of asset classes.

The results from the models are collected, reviewed and discussed by the RBC GAM Long-Term Returns Committee to arrive at the expected return assumptions. This committee also examines new asset classes to assess their long-term effectiveness at generating returns, modelling capability and inclusion in the portfolio construction process.

Each model operates independently but shares a common approach of employing forward-looking parameters in the context of historical results and empirical relationships to provide a long-term view on asset classes. The underlying core assumptions, starting points and calculations differ by model. A secondary, yet important, benefit of this approach is that it also recognizes that certain models may be better at forecasting specific asset classes than others, allowing for a broader coverage universe.

Multi-model approach for developing long-term capital market expectations



Source: RBC GAM

The Models

Currently, the committee reviews the results of four models to arrive at a consensus forecast of long-term return expectations.

1. FAIR VALUE MODELS (FVM)

- **Summary:** Key premise is that, at equilibrium, the market trades at a level that is consistent with its historic relationships to prevailing levels of interest rates, inflation and corporate profitability. For fixed income the model assumes that, over time, interest rates will reflect the demand for a real return plus an inflation premium.
- **Key inputs:** Earnings per share, dividends per share, book value, consumer price index (as proxy for inflation), short-term interest rates and long-term government bond yields
- **Modeling methods:** Least squares regression for equities, time-weighted average for fixed income

Equities

The following steps are undertaken on an ongoing basis:

1. Historical data:

- Index Earnings Per Share (EPS)
- Index Dividends Per Share (DPS)
- Index Book Value (BV)
- Inflation (Consumer Price Index – CPI)
- Short-term interest rates and long-term government bond yields (both nominal and real)

2. Regression analysis: The series of least squares regressions are generated relating the main drivers of the model (Price/Earnings and Return on Equity) to the following market data:

Price-Earnings Ratio (P/E):

- Inflation
- Long-term government bond yield
- Short-term interest rate
- Real long-term bond yield
- Real short-term interest rate
- Normalized ROE

Normalized Return on Equity (ROE):

- Inflation
- Long-term government bond yield
- Short-term interest rate
- Real long-term government bond yield
- Real short-term interest rate

3. Quantify the equilibrium P/E and ROE relationship: Estimates from the regression analysis are weighted according to their coefficients of determination (R2) to compute the equilibrium P/E and ROE.

4. Forecast the long-term capital markets assumptions: The equilibrium P/E and ROE are used to derive a future point estimate of the equilibrium price level. An estimate for long-term compound annual growth is then calculated by comparing the current and the forecasted equilibrium price levels, as well as accounting for dividends.

Fair Value modelling process for equities

Fixed Income

For fixed income assets, the FVM again relies on an equilibrium concept that assumes that, over time, interest rates will reflect the demand for a real return plus an inflation premium. Nominal interest rates should, therefore, move toward an equilibrium level offering investors an adequate real interest rate plus an offset for anticipated inflation.

A key principal of this model is based on adaptive expectations – the notion that expectations for the future are formed through past experience. With this in mind, the equilibrium real rate is calculated as the weighted average of the observed real rates in each of the prior 10 years, with the real rate of the most recent year weighted ten times that of the first year in the series, while each sequential year is weighted one less than the previous year. To forecast future real interest rates, it is anticipated that the current time-weighted real interest rate will revert to its long-term average level after five years and the data is interpolated between the two data points. The inflation premium is calculated as the average of the past 18 months' year-over-year percentage change in Consumer Price Index, as well as the expectations for the 18 months ahead.

A forecast is calculated assuming the bond yield will move to its modeled equilibrium level by the end of the forecast horizon. The calculation accounts for income from coupon payments earned over the entire period as well as movement in the bond price as a result of the change in yield.

2. GLOBAL VALUATION-BASED MODEL

- **Summary:** Regressions between past valuation levels and subsequently delivered performance offer a basis for forecasting equity-market returns from current levels. Blending multiple valuation metrics into a single composite reduces the dependency on any one indicator.
- **Key inputs:** Index level, trailing and forward earnings per share, market capitalization, nominal GDP, corporate enterprise value, corporate net worth, inflation, RBC GAM fair value, short-term interest rate, 10-year bond yield
- **Modeling methods:** Clustered average, linear regression

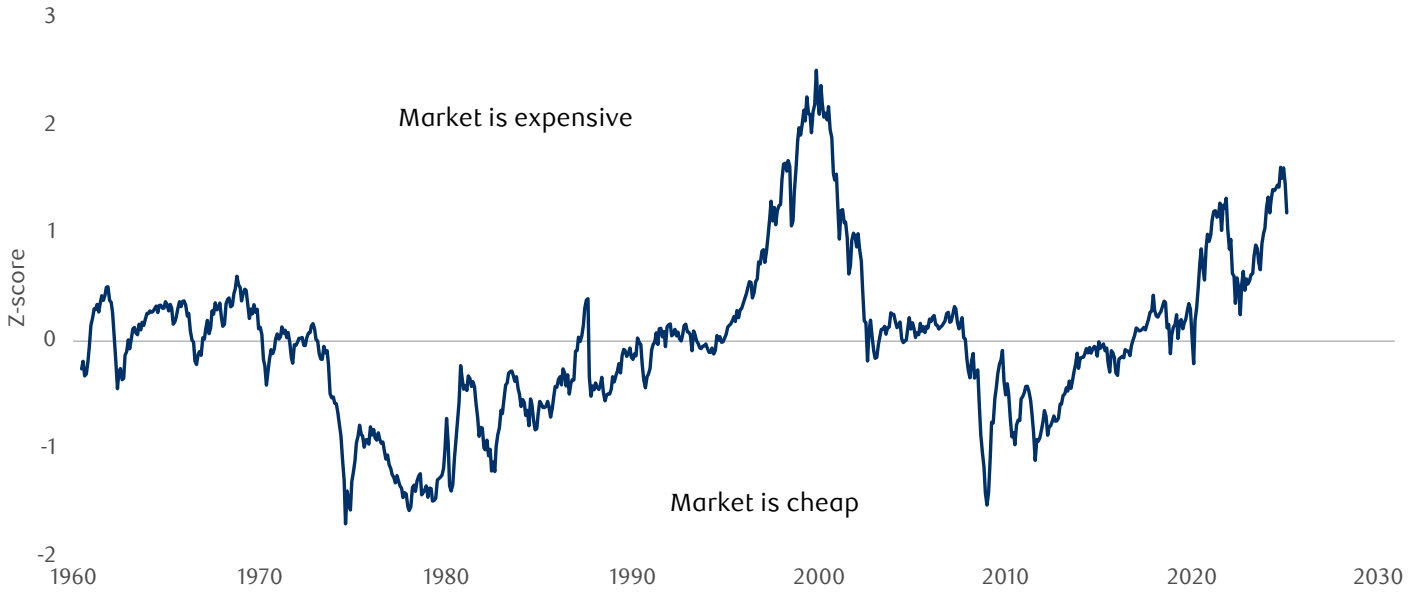
Leveraging historical relationships, our global valuation-based forecasting framework forms an expectation for stock returns based on their current values. These forecasts are drawn from regressions between historical returns and our valuation composites for six equity regions: U.S., Canada, U.K., Japan, Europe, Emerging Markets. This methodology reveals that valuation at the onset of an investment decision has a significant impact on subsequent returns. Buying stocks when they were cheap has yielded higher returns than buying them when they were expensive. The valuation-based forecasting framework captures this notion through a mathematical approach.

For each market, a valuation composite is constructed by combining eight different metrics (Exhibit 1). Each metric is standardized and grouped into three separate buckets based on their type (absolute, multi-factor, or relative) and blended together (Exhibit 2). This clustered composite approach is a way to come up with a weighted average in a quantitatively driven manner that maximizes the relationship between valuation metrics and minimizes the correlation between each distinct group.

Exhibit 1: List of equity-market valuation metric

#	Valuation metric	Type of metric	Calculation
1	Market cap to GDP ratio	Absolute	Mkt cap to GDP = Stock index market cap / Country's nominal GDP
2	Tobin's Q	Absolute	Tobin's Q = Corporations enterprise value / Corporations net worth
3	12-month trailing P/E	Absolute	Last 12-month P/E = Index price level / 12-month trailing index EPS
4	12-month forward P/E	Absolute	Next 12-month P/E = Index price level / 12-month forward index EPS
5	Cyclically adjusted P/E (CAPE)	Absolute	CAPE = Real index price level / 10-year trailing average real EPS
6	RBC GAM fair value	Multi-factor	Fair value = Normalized earnings × equilibrium PE Note: a combination of current and forecast levels of interest rates, inflation and corporate profitability, weighted according to least square regressions, determines the appropriate levels of earnings and PE for the market.
7	Equity risk premium	Relative	ERP = (Earnings yield + g) - Rf Where: g = long-term EPS growth rate Rf = risk-free rate, defined by 3-month bill rate
8	Fed model (spread)	Relative	Fed model spread = Earnings yld - 10y govt bond yld

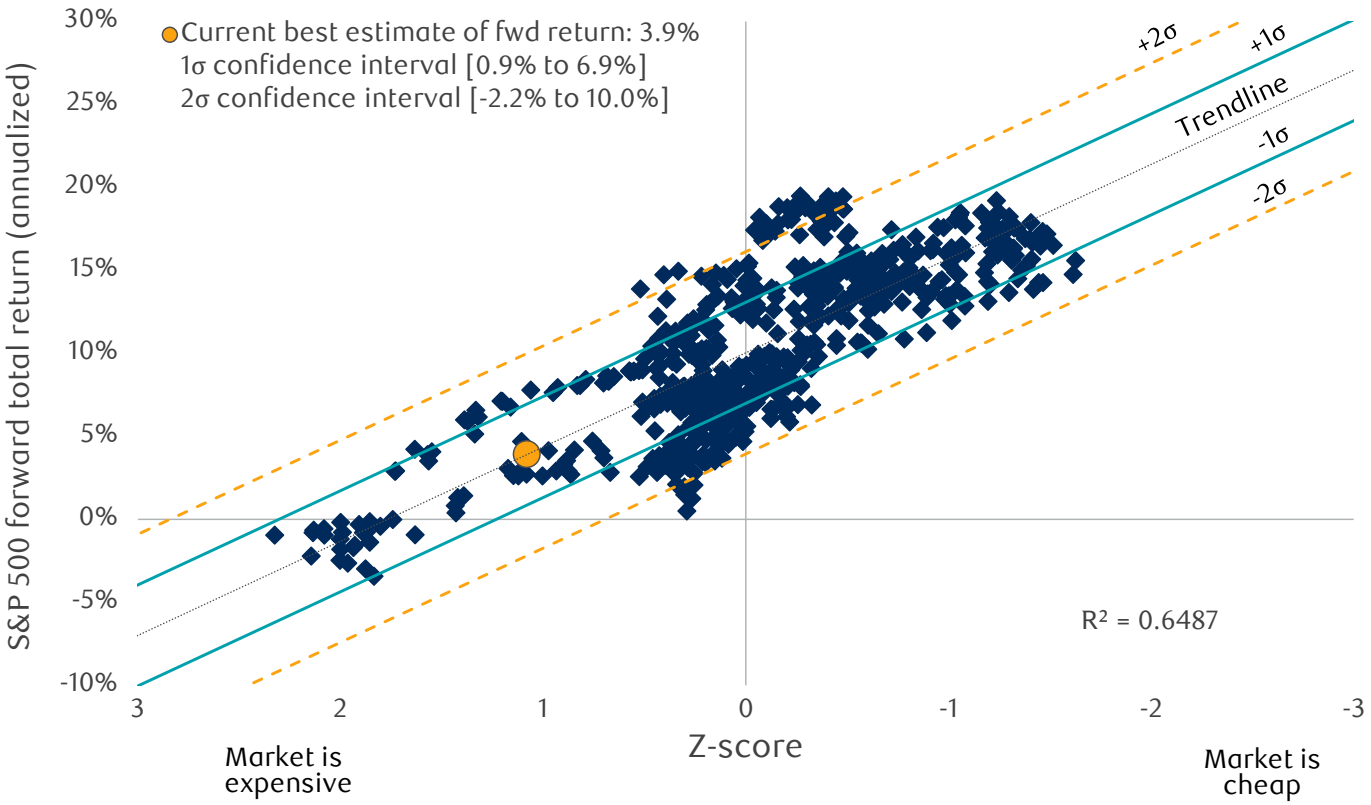
Exhibit 2: S&P 500 clustered valuation composite



Note: historical data from January 1956 for 12-month trailing P/E, 12-month forward P/E, equity risk premium, Shiller CAPE, Tobin's Q and Fed model. Historical data from March 1956 for market cap ÷ global GDP. Historical data from Jan 1960 for RBC GAM fair value. As of March 31, 2025. Source: Bloomberg, RBC CM, RBC GAM

Regressions are then run based on the levels of these valuation composites and realized total returns over subsequent 10-year periods on a monthly rolling basis (Exhibit 3). These relationships are computed in real-return space to reduce intercept bias from differences in historical versus expected inflation. The model forecasts the next 10 year real (i.e. before inflation) return by solving the regression's linear trend line equation using the current valuation level as the independent variable. Adding our inflation forecast to this figure results in the final 10-year nominal return forecast. This procedure is run for each of the six markets.

Exhibit 3: S&P 500 return versus average valuation metric z-score
10-year forward total returns



Note: As of March 31, 2025. Z-score = number of standard deviations above/below equilibrium. Source: RBC GAM

3. CROSS-SECTIONAL MODEL

- **Summary:** Relies on the capital asset pricing model (CAPM) which captures the risk/return trade-off. The CAPM is modified to include forward-looking indicators for each asset class.
- **Key inputs:** Bond index yield to maturity, dividend estimates
- **Modeling methods:** Capital asset pricing model (CAPM), cross-sectional regression model

Within each asset class, long-term expected returns are estimated from forward-looking measures for their internal rate of return (IRR). For bonds, a bond index yield to maturity is the proxy and for equities a dividend discount formula is used. On their own, these could serve as long run forecasts, but this model takes an additional step to examine these variables in the context of a simple asset pricing framework.

Expected returns across asset classes differ due to exposure to two factors:

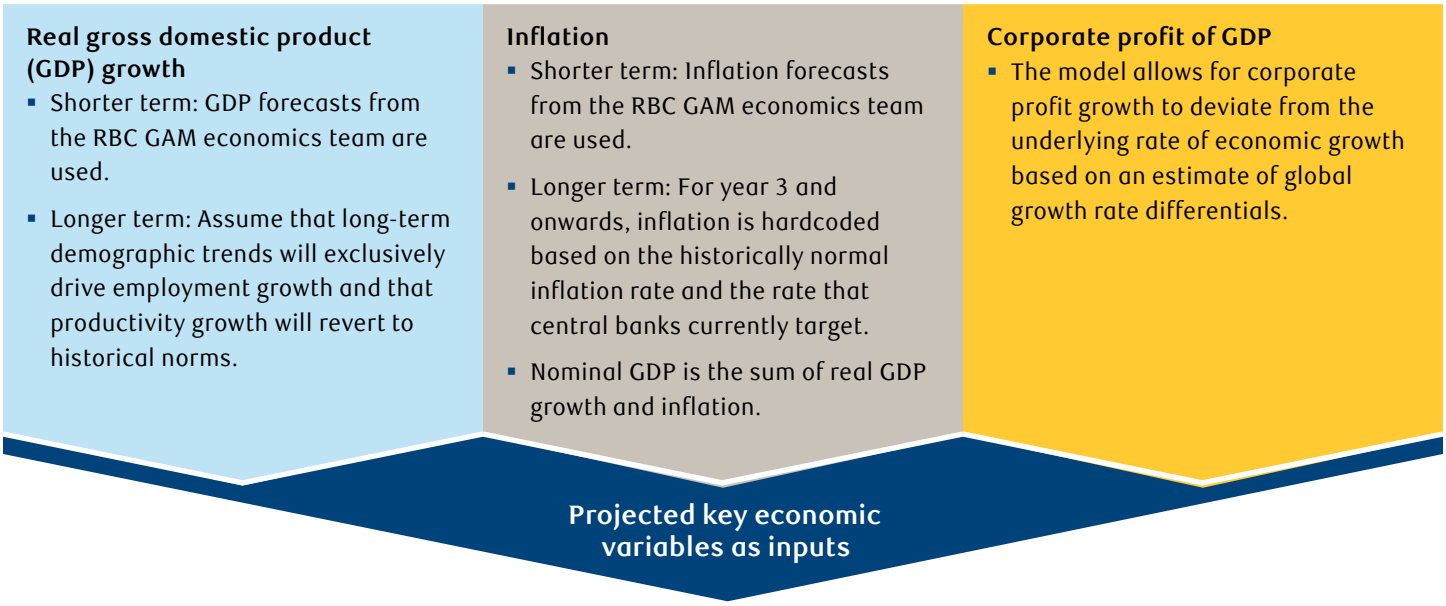
1. Equity risk as measured by βeta to global equity returns (a 5-year rolling CAPM βeta to world equity markets is the proxy for equity risk)
2. Interest rate risk as measured by duration

The model produces 5- to 10-year estimates and is scalable to cover additional markets where there is sufficient quality data.

4. ECONOMIC MODEL

- **Summary:** The economic-based long-term asset forecasting model uses a combination of historical norms, economic projections and demographic characteristics to derive expected return estimates.
- **Key inputs:** Forecasts for real GDP, CPI, corporate profit share of GDP, population growth, productivity growth and other macroeconomic drivers
- **Modeling methods:** Econometric models

The model uses a combination of historical norms, economic projections and demographic characteristics to provide 5-year, 10-year and 30-year expected returns for equity and fixed income markets. The process begins by formulating projections for key economic variables.



The economic variables serve as inputs into the financial market projections

Fixed income

- **Policy rate** – In the short-term, the policy rate is based on the forecast by the RBC GAM economics team for the current and following years. In the longer-term, the expected policy rate is set equal to 50% of the nominal GDP growth rate plus 50% of the nominal 10 year yield, less 0.75% – calculations based on historical connections between interest rates, the slope of the yield curve and economic growth. For emerging markets, a proxy for the policy rate is based purely on forecasted GDP growth rates for the sector.
- **10-year government bond yields** – The short-term 10-year government yield is forecast by the RBC GAM economics team for the current and following years. The longer-term "normal yield" is arrived at using a statistical framework established by the Bank of England (BoE). This involves the use of many economic variables (GDP, dependency ratio, wealth inequality, global savings glut, relative rate of inflation in global capital formation versus global consumption, global public investment share of GDP, global spread between the cost of capital and the real interest rate), with regression coefficients drawn from the BoE paper permitting these to be integrated into a coherent real yield forecast. The rate of inflation is then added to generate the nominal 10-year yield forecast for each country.
- **3-month government bond yields** – Estimated by examining the historical relationship to the policy rate.
- **5-year government bond yields** – A regression study is run to determine the appropriate 5-year yield given the already-forecast level of the 3-month yield and the 10-year yield.
- **Credit** – The total return on credit is calculated based on the forecast that credit spreads, default rates and recovery rates mean-revert.

Equities

Calculating the total return in the stock market requires forecasting the following variables: the P/E ratio, earnings growth and the dividend yield. For the coming year, the level of the stock market index is set equal to the forecasts established by the RBC GAM Investment Strategy Committee.

For more distant years, the stock index moves in response to changes in projected earnings and valuations. Earnings growth is set equal to nominal GDP growth plus the change in the corporate profit share of GDP.

This is driven by international growth differentials and their effect on the overseas portion of corporate profits. Any contribution from valuations comes from a changing P/E ratio). For the first two years, the P/E ratio is reverse engineered from the hard-coded forecast for the stock index and from our earnings estimate (which comes from our nominal GDP and corporate profit share of GDP projections).

For the following ten years, the P/E ratio is a straight line convergence toward an estimated long-term equilibrium P/E. To calculate this long-term equilibrium, the RBC GAM economics team's process combines the results of an econometric model that identifies a non-linear connection between the P/E ratio and the real 10-year government yield and the country-specific historical average P/E. For estimate purposes, these inputs are weighted at 33% and 67% respectively.

RBC GAM Long-term capital market assumptions

Annualized return expectations, as of March 31, 2025

Fixed Income	Reference Index	GAM Expected Return 10-year (%)	GAM Expected Return 20-year (%)	GAM Expected Return 30-year (%)	Standard Deviation (%)
U.S. Cash	FTSE CD 1 Month Index	3.15	3.15	3.15	0.5
CDN Cash	FTSE Canada 30 day T-Bill Index	2.65	2.70	2.70	0.4
GBP Cash	FTSE U.K. Sterling Euro Deposit (1 M) (LOC)	3.40	3.25	3.20	0.5
Euro Cash	FTSE Euro Euro Deposit (1 M) (LOC)	1.85	1.90	1.95	0.5
Japan Cash	FTSE Japanese Yen Euro Deposit (1 M) (LOC)	0.55	0.50	0.65	0.5
EM Cash	JP Morgan ELMI+	3.90	3.90	3.90	6.0
CDN Provincial Bonds	FTSE Canada Provincial Bond Index	4.25	3.85	3.75	4.5
CDN Federal Bonds	FTSE Canada Federal Bond Index	3.45	3.15	3.05	3.5
CDN Government Bonds	FTSE Canada All Government Bond Index	3.85	3.50	3.40	4.0
CDN Corporate Bonds	FTSE Canada All Corporate Bond Index	4.60	4.30	4.25	5.0
CDN Universe Bonds	FTSE Canada Universe Bond Index	4.05	3.70	3.65	4.5
U.S. Government Bonds	ICE BofA 1-10 Year U.S. Treasury Index	4.85	4.25	4.05	4.0
U.S. Corporate Bonds	ICE BofA 1-10 Year U.S. Corporate Index	5.50	5.00	4.85	6.0
U.K. Government Bonds	ICE BofA 1-10 Year U.K. Gilt Index	5.20	4.40	4.20	3.7
U.K. Corporate Bonds	ICE BofA 1-10 Year Sterling Corporate Index	6.05	5.50	5.35	5.5
Euro Government Bonds	Iboxx EUR Sovereigns	3.95	3.35	3.25	4.0
Euro Corporate Bonds	Iboxx EUR Corporates	4.75	4.30	4.20	6.0
Asian Bonds	HSBC Asian Local Bond Index LCL	1.90	1.90	1.90	7.0
World Government Bonds	FTSE WGBI	4.35	3.60	3.45	3.5
HY Bonds	ICE BofA U.S. High Yield Index	6.40	6.05	5.95	9.0
EM Bonds	JPM EMBI Global Diversified USD	6.25	5.65	5.45	10.0
Global Bonds	Bloomberg Global Aggregate Bond Index (USD)	4.85	4.30	4.15	5.0
Equities		**GAM Expected Return 10-year (%)**	**GAM Expected Return 20-year (%)**	**GAM Expected Return 30-year (%)**	**Standard Deviation (%)**
CDN Equities	S&P/TSX Composite	7.40	7.65	7.75	16.0
U.S. Equities	S&P 500	5.25	6.45	7.10	15.0
U.S. Equities (Equal Weight)	S&P 500 Equal Weighted Index	8.05	8.15	8.30	16.3
U.S. Mid Caps	S&P 400	9.55	8.60	8.10	18.0
U.S. Small Caps	S&P 600	11.55	9.75	9.00	20.0
U.K. Equities	FTSE All-Share	8.75	8.30	7.95	15.0
Europe Equities ex UK	MSCI Europe ex U.K. LCL	8.40	8.05	7.85	17.0
Asian Equities	MSCI AC Asia Pac LCL	6.50	6.35	6.50	16.0
Asia ex. Japan Equities	MSCI AC Asia Pacific ex. Japan	10.65	9.05	8.70	15.0
China Equities	MSCI China	9.20	8.20	7.60	28.0
Japan Equities	Nikkei 225 Average PR JPY	6.55	5.95	5.70	15.0
Australian Equities	S&P/ASX 200	6.80	7.35	7.75	14.0
Developed Markets (World)	MSCI World	6.10	6.65	6.95	14.5
EM Equities	MSCI EM LCL	9.45	9.35	10.20	18.0
EAFE Equities	MSCI EAFE	8.00	7.60	7.40	15.0
Inflation		**GAM Expected Inflation 10-year (%)**	**GAM Expected Inflation 20-year (%)**	**GAM Expected Inflation 30-year (%)**	
United States	U.S. Consumer Price Index	2.5	2.4	2.3	
Canada	Canada Consumer Price Index	2.2	2.1	2.1	
United Kingdom	U.K. Consumer Price Index	2.4	2.3	2.3	
Japan	Japan Consumer Price Index	1.9	1.8	1.7	
Eurozone	Euro Area Harmonized Index of Consumer Prices	2.1	2.1	2.1	
Emerging Markets	Emerging Economies Consumer Price Index	3.0	2.9	2.9	

Notes: Asset assumptions as of March 31, 2025. Source RBC GAM

1. Fixed income indices may have compositional differences which could impact the comparability of return expectations between regions.
2. Fewer of our models contribute to forecasts for U.S. small cap and U.S. mid cap equities and, as a result, less breadth of information is contained in these figures as compared to other asset classes.
3. Standard deviation based on long-term historical average of 3-year periods on a monthly rolling basis, annualized.

LONG-TERM RETURNS COMMITTEE

Establishing a final "house view" based on the results of the four models is the work of the RBC Global Asset Management Long-Term Returns Committee ("the committee"). The committee is comprised of RBC GAM's Chief Investment Officer, Head of Investment Policy, Head of Quantitative Investments, Chief Economist, Risk Management specialist and other select experts.

The committee meets regularly to compare and discuss the outputs of the models and assesses any significant structural market shifts or emerging trends that appear to be long-term in nature to arrive at final recommendations. Unexpected market shifts or policy changes can necessitate ad-hoc meetings to evaluate impact on the long-term capital markets assumptions. The committee is also a forum for the discussion of new asset classes, new forecasting tools, methods and refinements to the existing process. Currently, the committee provides strategic expected return forecasts for over 40 asset classes.

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